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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :		(11) International Publication Number:
H04Q 7/38, H04B 7/216	A1	WO 99/53710
		(43) International Publication Date: 21 October 1999 (21.10.99)

(21) International Application Number: PCT/KR99/00175

(22) International Filing Date: 13 April 1999 (13.04.99)

(30) Priority Data:
1998/13149 13 April 1998 (13.04.98) KR

(71) Applicant: SAMSUNG ELECTRONICS CO., LTD. [KR/KR]; 416, Maetan-dong, Paldal-gu, Suwon-shi, Kyungki-do 442-370 (KR).

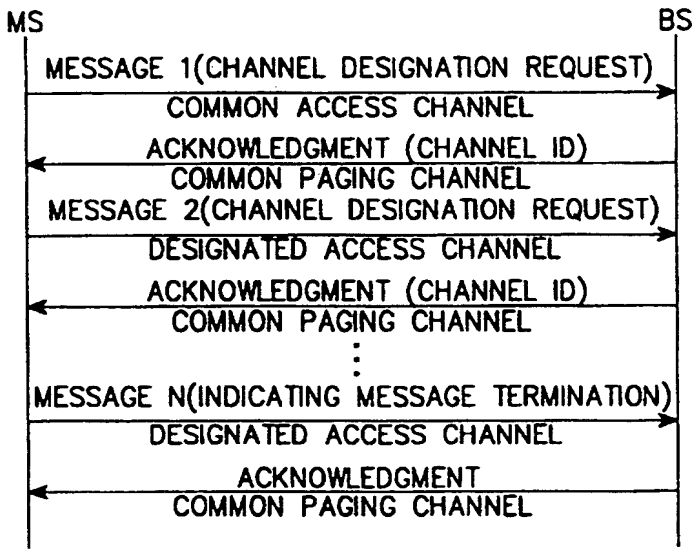
(72) Inventors: JUNG, Ki, Sung; 404-2, Gukal-ri, Kihung-up, Yongin-shi, Kyonggi-do 449-900 (KR). MOON, Hi, Chan; 391, Pungnap-dong, Songpa-gu, Seoul 138-040 (KR). LEE, Hyun, Suk; Jugong Apt., 4-danji, 420-106, Chamshil 3-dong, Songpa-gu, Seoul 138-790 (KR). AHN, Jae, Min; Puleunsamho Apt., 109-303, Irwonpon-dong, Kangnam-gu, Seoul 135-239 (KR).

(74) Agent: LEE, Keon, Joo; Mihwa Building, 110-2, Myon-gryun-dong 4-Ga, Chongro-gu, Seoul 110-524 (KR).

(81) Designated States: AU, BR, CA, CN, JP, RU, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: DEVICE AND METHOD FOR TRANSMITTING COMMON CHANNEL MESSAGE IN CDMA COMMUNICATION SYSTEM



(57) Abstract

The present invention relates to a common channel message transmitting device and method in a CDMA communication system. In the transmitting method, an MS sends a common channel message with a request for designation of a channel for transmission of a consecutive common channel message, and a BS sends a response message having an available channel ID for the message received from the MS. Then, the MS sends the next message on a channel designated with the assigned channel ID by analysing the response message.

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DEVICE AND METHOD FOR TRANSMITTING COMMON CHANNEL MESSAGE IN CDMA COMMUNICATION SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to the field of wireless communication, and more particularly to a device and method for transmitting a common channel message in a CDMA (Code Division Multiple Access) communication system.

2. Description of the Related Art

In a communication system based on the TIA/EIA/IS-95 standard, messages are communicated between a base station (BS) and a mobile station (MS) generally on a forward paging channel and a reverse access channel which are common channels before a voice call is set up. For communication with the MS, the BS must transmit a message on the paging channel and receives a response on the access channel. From the mobile's perspective, for communication with the BS, the MS transmits a message on the access channel and receives a response on the paging channel. There can be a plurality of paging and access channels. Each paging channel is distinguished by a unique Walsh code, and each access channel by a long

code generated with an access channel long code mask.

Upon generation of a common channel message to send, the MS transmits the message on an access channel at a predetermined power level and awaits an acknowledgement from the BS. However, this common channel message transmission is susceptible to message contention if other MSes use the same access channel, resulting in a reception failure in the BS. If the MS fails to receive the acknowledgement within a predetermined time, it retransmits the access channel message at a power level incremented by a specified amount and awaits an acknowledgement from the BS.

In the case where the message is too long to be sent at one time, it should be divided into appropriate segments prior to transmission by repeating the above procedure. FIG. 1 is a flowchart illustrating a conventional message exchange when a message is longer than transmissible at one time and divided into segments for transmission. In this method, the MS sends a message segment on an access channel and accesses an access channel again to send the successive message segment.

In the conventional access channel communication method, if mobile stations (Mss) sharing the same long code simultaneously transmit messages on the access channel, a message contention occurs, resulting in the loss of the messages. This mechanism is generally referred to as contention-based random access.

In the event a message contention should occur on the access channel, the MS should re-attempt to transmit the message on the access channel. In this case, each MS transmits a message on the access channel using the long code commonly

shared by the mobile stations (MSs), and if message contention should occur, the MS perceives the message occurrence in a predetermined time and re-transmits a message transmission after a randomized time delay. The MS initially attempts to access the BS, via the access channel at a predetermined power level. When it fails to receive an acknowledgement from the BS, it performs the next attempt at a power level a specified amount higher than the previous attempt. If repeated attempts to access the access channel result in failures, the procedure starts again at the lowest predetermined power level.

In accordance with the conventional common channel message transmitting method, when the message length is too long to be sent at one time, message segments are transmitted on an access channel in successive time ntervals, Therefore, in situation where different MSs attempt to send messages on the access channel by a shared long code, a message contention is a common occurrence, thereby incurring a long delay in transmission of an access channel message. Hence, there exists a need for a method to enable a mobile station to rapidly transmit a common channel message.

SUMMARY OF THE INVENTION

An object of the present invention, as embodied and broadly described herein, is to provide a device and method for enabling an MS to rapidly transmit a common channel message in a CDMA communication system.

Another object of the present invention is to provide a device and method for enabling an MS to continuously transmit a common channel message on a designated channel if the common channel message is longer than a predetermined

length, in a CDMA communication system.

A further object of the present invention is to provide a device and method for enabling an MS to continuously transmit a common channel message on a channel temporarily designated as dedicated in a CDMA communication system.

Still another object of the present invention is to provide a device and method for enabling an MS to transmit the first segment of a common channel message exceeding a predetermined length on a common channel and the following segments on a channel designated by a BS in a CDMA communication system, in order to prevent a message contention for the common channel.

To achieve the above objects, there is provided a common channel message transmitting device and method in a CDMA communication system. In the transmitting method, an MS sends a common channel message with a request for designation of a channel for successive transmission of a consecutive common channel message, and a BS sends a response message having an available channel ID for the message received from the MS. Then, the MS analyses the response message and sends the next message on a channel designated with the assigned channel ID.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objects and advantages of the present invention will become more apparent by describing in detail a preferred embodiment thereof with reference to the attached drawings in which:

FIG. 1 illustrates the exchange of messages on common channels in a

conventional communication system;

FIG. 2 illustrates the exchange of messages on common channels in a communication system according to an embodiment of the present invention;

FIGs. 3A and 3B respectively illustrate the structures of an MS initiated message and a BS initiated message which are sent on common channels according to the embodiment of the present invention;

FIG. 4 is a block diagram of an MS in the communication system according to the embodiment of the present invention;

FIG. 5 is a block diagram of a BS according to the embodiment of the present invention;

FIG. 6 is a flowchart of an MS operation for transmitting a message on a common channel according to the embodiment of the present invention; and

FIG. 7 is a flowchart of a BS operation for transmitting a message on a common channel according to the embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the present invention will be described in detail with reference to the attached drawings. Like reference numerals denote the same components in the drawings.

Terms and Definitions

1. "channel identification (ID)" as used herein indicates the particular spreading code information of a common channel which can be temporarily designated as dedicated (contention free) to allow an MS to send a reverse common channel message to a BS.

2. "spreading code information " is a general term used for indicating use of public long code mask generated from the ESN (Electronic Serial Number) of an MS, and a specific long code ID for designation.

3. "access channel number" is used as a part of a long code mask for an MS to send an access channel message to a BS on a channel temporarily designated as dedicated in order to avoid message collision between mobile station (MSs).

4. "spreading code using an ESN" refers to a public long code produced with the unique ESN of an MS.

5. "specific long code" is a long code prepared to prevent a message contention. A channel ID is assumed to be the long code ID of a common channel which can be temporarily designated as dedicated to a specific MS or as semi-dedicated to a few MSes in the embodiment of the present invention.

6. "message flag" is a more message flag informing whether there is a message following the current message.

7. "channel designation request flag" is used for an MS to request designation of a specific access channel as dedicated for transmission of an access channel message.

8. "channel designation flag" indicates whether a BS designates a common channel as designated in response to an MS request to do so.

9. "designation means" designate a long code mask for spread reverse

common channel message to avoid collision between other MSes.

If a reverse common channel message is too long to be sent at one time, an MS divides the message into appropriate segments for transmission. In the embodiment of the present invention, the MS sends the first segment of the message on a common access channel and all other segments on an access channel designated as dedicated by a BS, to thereby prevent a collision with other MSes which are simultaneously attempting to transmit on the access channel. It also can implement that the MS requests designation of reverse channel not include said divided message and receives designation spreading code from BS and then transmits said divided message on the designated channel.

FIG. 2 is a message flowchart of an MS operation for transmitting a message on a common access channel in a CDMA communication system according to the embodiment of the present invention.

FIGs. 3A and 3B respectively illustrate the formats of an MS originated message to be transmitted on a common access channel and a BS responded control message to be transmitted on a common paging channel.

In FIG. 3A, a message type format for transmitting a message on a common access channel includes a message type field (e.g., data or acknowledgement), a sequence number field indicates the number of a corresponding message segment when messages are consecutively transmitted, a message flag field represents the presence or absence of the next message, a channel designation request flag is used for an MS to request designation of a channel on which a message is sent, and a data field provides actual data to be transmitted. It is assumed here that when the

message flag field is set it represents the presence of a subsequent message segment to send. It therefore following that a cleared message flag field represents the absence of subsequent message segment. It is also assumed that when the channel designation request flag is set, this indicates an MS request for designation of a channel on which to send a message, and a cleared channel designation request flag field 36 indicates no MS request for designation of the channel. In response to the channel designation request, channel designation may be selected b the BS as either a long code that a specific MS can use an access channel as dedicated, or an ESN for generating the long code. Hereinafter, a designated channel refers to a channel designated as dedicated to an MS for sending an access channel message to a BS.

In FIG. 3B, there is illustrated the structure of a BS generated control message to be transmitted to the MS on a common paging channel which includes a message type field 31 for indicating a message type (e.g., control message), a sequence number field 33 indicates the number of a received message when messages are consecutively received, a channel designation flag 35 represents whether a channel requested by the MS is designated or not depending upon its set or cleared status, and a channel ID field 37 provides the long code ID of an access channel designated as dedicated to a specific MS or as semi-dedicated to a few Mses. In the case of designate public long code mask generated from ESN, the MS knows oneself ESN and generates public long code mask using said ESN, so there is not need to transmit said long code ID but only indicate use of public long code mask.

Referring to FIGs. 2, 3A, and 3B, a method for transmitting a common access channel message exceeding a one-time transmissible length will be explainned, the MS divides the message into a plurality of message segments and

transmits the first message segment on a common access channel. Then, the MS requests designation of a channel to consecutively send all remaining message segments. The access channel message is constituted as shown in FIG. 3A. Upon reception of the designation request on the reverse common access channel from the MS, the BS determines whether the message flag 34 and the channel designation request flag 36 is set. If both flags are set, the BS determines whether there is an available long code to designate an access channel as dedicated. If there is, the BS sends the MS a response message having a channel designation flag set and the available long code ID 37, as shown in FIG. 3B, on a common paging channel.

Then, the MS sends the next message segment on the access channel designated with use of the designated long code ID assigned by the BS. If there are additional message segment, the message flag and the channel designation request flag of the current message segment are set. In addition to the first segment transmitted on the designated access channel. It should be noted that the long code ID assigned by the BS can be identical to or different from the presently using channel ID. If there is no long code available for designation of an access channel as dedicated, a control message generated from the BS clear the channel designation flag. In this case, the MS must report to selecting a common access channel again to send a remaining message segment.

In the above procedure, when the MS is to send the last message segment, it clears the message flag and the channel designation request flag. Then, the BS generates a control message to clear the channel designation flag in response to the last message segment.

FIG. 4 is a block diagram of an MS for transmitting an access channel

message according to the embodiment of the present invention, and FIG. 6 is a flowchart illustrating the transmission of an access channel message from the MS of FIG. 4. FIG. 5 is a block diagram of a BS for generating a control message in response to a message received from the MS, and FIG. 7 is a flowchart of transmission of the control message from the BS of FIG. 5.

FIG. 5 is a block diagram of a BS for generating a control message in response to a message received from the MS, and FIG. 7 is a flowchart illustrating the transmission of a control message from the BS of Fig. 5.

Referring to FIG. 4, a receiver 411 in the MS converts an RF signal received through an antenna to a baseband signal, and a demodulator 413 demodulates the baseband signal to an original signal. A message generator 415 generates an access channel message. A message processor 417 converts the access channel message to a format shown in FIG. 3A by analysing its length. The message processor 417 also generates a long code ID for an assigned channel by analysing the fields of the control message received from the demodulator 413, shown in FIG. 3B.

A memory 423 stores long code IDs for designating a channel. The long code IDs can be long code mask information to designate access channels as collision free. A long code controller 421 determines what long code to generate referring to the long code ID received from the message processor 417 and the long code IDs stored in the memory 423. If no long code ID is received from the message processor 417, the long code controller 421 selects one of the long code IDs from among the common access channels stored in the memory 423. In the case where the first access channel message segment is to be transmitted or no long code ID is generated from the message processor 417, the long code controller 421

outputs a long code ID selected from those stored in the memory 423. Otherwise, if a long code ID is generated from the message processor 417 or a message segment other than a first message segment is to be transmitted, the long code controller 421 causes the long code of an access channel corresponding to the long code ID to be generated. A long code generator 425 generates the corresponding long code under the control of the long code controller 421.

Therefore, the long code IDs stored in the memory 423 can be for common access channels shared by a plurality of MSes and the long code ID output from the message processor 417 is one for allowing a specific MS or a few MSes to use an access channel as dedicated or semi-dedicated.

A channel encoder & orthogonal modulator 419 subjects the reverse access channel message received from the message processor 417 to channel-coding, repetition, interleaving, and orthogonal spreading. Multipliers 427 and 429 multiply the long code received from the long code generator 425 by PN sequences PNI and PNQ, respectively. A PN spreader 431 multiplies the I channel and Q channel PN sequences received from the multipliers 427 and 429 by the orthogonally spread signal received from the channel encoder & orthogonal modulator 419. A transmitter 433 converts the spread access channel message received from the PN spreader 431 to an RF signal prior to transmission.

In operation, the receiver 411 in the MS receives an RF signal from the BS, and the demodulator 413 generates a control message by subjecting the received signal to despreading and decoding. Then, the message processor 417 extracts a channel designation flag and a long code ID (i.e., channel ID) for channel designation from the control message of FIG. 3B, analyses the fields, and controls

the long code controller 421 based on the analysis.

The long code controller 421 determines a long code in the following procedure. In the presence of a long code ID assigned by the BS, the long code controller 421 controls a long code corresponding to the long code ID to be generated. In the absence of such a long code ID, or if an access attempt is failed on an access channel of the long code ID received from the message processor 417, the long code controller 421 selects a long code ID by a random number generation function among available long code IDs stored in the memory 423. The random number generation function generator resides in the long code controller 421.

Now turning to FIG. 5, the BS includes a message generator 511 for generating a control message including (long code ID) information to designate a spread code ID to be used in an access channel on which to send an access channel message. A modulator 515 modulates the control message and a transmitter 517 converts the modulated signal to an RF signal prior to transmission. The message generator 511 feeds the long code ID to a demodulation controller 521. Then, the demodulation controller 521 controls a demodulation unit 527 based on the long code ID information to demodulate a signal received from a receiver 525. A first memory 513 stores the long code IDs assigned to MSes for current use, as listed below in Table 1, and a second memory 523 stores the long codes, as listed in Table 2, used by respective demodulators 551 to 55M in the demodulation unit 527. The message generator 511 refers to the information stored in the first and second memories 513 and 523 in generating a control message.

(Table 1)

MS ID	long code ID
mobile 1	long code 1, 10, 25, ...
mobile 2	long code 10, 30, ...
mobile 3	long code 11, ...
-	-
-	-
-	-

(Table 2)

demodulator No.	long code ID	dedicated/common
demodulator 1	long code 1	dedicated
demodulator 2	long code 30	common
demodulator 3	long code 11	common
-	-	-
-	-	-
-	-	-

As illustrated in Table 1, the first memory 511 stores long code IDs currently assigned to MSes within a coverage area of the BS, and the second memory 523 stores the long code IDs in current use by the demodulators 551 to 55M as shown in Table 2. The message generator 511 determines an available long code ID based on the long code ID information of the first memory 521 and loads the long code ID on a control message. The demodulation controller 521 receives access channel

message information from the message generator 511 and assigns long codes for despreading to the demodulators 551 to 55M, to thereby reliably demodulate a signal received from the receiver 525.

An access channel message transmission from the MS of FIG. 4 to the BS of FIG. 5 will be described in detail with reference to FIGs. 6 and 7.

Upon reception of an access channel message from the message generator 415 of the MS in step 612, the message processor 417 controls the long code controller 421 to select a common access channel in step 614. Then, the long code controller 421 searches long code ID which is included in the message, for the selected common access channel from the memory 413 and outputs the long code ID to the long code generator 425. In step 616, the message processor 417 determines whether the access channel message can be sent at one time by comparing its length with the maximum length of a one-time transmissible message. If the access channel message is transmissible at one time, the message processor 417 generates an access channel message having a message flag and a channel designation request flag cleared, in steps 636 and 638. Then, the access channel message is subject to necessary subsequent processing and transmitted in step 640. The MS awaits a response message from the BS in step 642. In this case, the access channel message is sent on the common access channel, notifying the BS that there is no additional message segment to be sent and a channel designated by the BS is not used.

If the access channel message is too long to be sent at one time in step 616, the message processor 417 divides the access channel message into segments each segment being transmissible at one time, in step 618. In step 620, the message

processor 417 sets a message flag to indicate that there is an additional message segment to be sent, and in step 622, it determines whether to use a channel designated through user manipulation or internal parameters by the BS, for transmission of the consecutive access channel message segments. If the MS does not intend to use the designated channel, it clears a channel designation request flag in step 638. In steps 640 and 642, the MS sends the access channel message segment and awaits a response message from the BS. This implies that the next access channel message segment will be sent on a common access channel instead of a channel designated by the BS.

Yet, if the MS intends to send the consecutive access channel message segment on a channel designated by the BS in step 622, the message processor 417 sets the channel designation request flag in step 624, which implies that the next message segment will be sent on the channel designated by the BS. In step 626, the access channel message segment is sent through the channel encoder & orthogonal spreader 419, the PN spreader 431, and the transmitter 433. Upon reception of a response message as shown in FIG. 3B from the BS in step 628, the message processor 417 checks the channel designation flag of the response message to determine whether there is a designated channel available to the MS, in step 630. If the channel designation flag is cleared, the message processor 417 determines that there is no available channel to be designated as dedicated for transmission of the next access channel message segment, and feeds information for selecting a common access channel to the long code controller 421 in step 632. If the channel designation flag is set, the message processor 417 determines that the BS designated a channel as dedicated to the MS and outputs a long code ID corresponding to the designated channel to the long code controller 421, in step 634. Then, the long code controller 421 outputs the long code ID of the designated channel to the long code

generator 425, so that the MS can send the access channel message shown in FIG. 3A on the designated channel.

In the above operation, if there is an access channel message to be consecutively transmitted, the MS requests designation of a channel by setting a channel designation request flag and determines whether the requested channel is designated or not by checking the channel designation flag of a control message received from the BS. In sending the last message segment, the MS clears the message flag and the channel designation request flag.

Referring to FIG. 7, upon reception of an access channel message from the MS in step 711, the message processor 519 of the BS determines whether there is a following access channel message to receive from the MS by checking the message flag of the received access channel message, in step 713. If the message flag is cleared, indicating that the currently received message is the last one, the message processor 519 clears a channel designation flag in step 721 and outputs a response message as shown in FIG. 3B to the modulator 515. The cleared channel designation flag keeps the MS from accessing a designated channel.

If the message flag is set in step 713, the message processor 519 checks the channel designation flag of the received access channel message in step 715. If the channel designation request flag is cleared, the message generator 511 generates a response message having the channel designation flag cleared, in steps 721 and 723. If the channel designation request flag is set, the message generator 511 determines whether there is an available long code ID for designating a channel, referring to the long code IDs currently being occupied from the first memory 513. In the absence of an available long code ID, the message generator 511 clears the channel

designation flag to notify the MS that the channel designation request cannot be acknowledged in step 721 and sends the response message in step 723.

In the presence of an available long code ID in step 717, the message generator 511 sets the channel designation flag and loads the available long code ID in a response message in step 719 and sends the response message in step 723.

As described above, the BS determines whether there is another message to receive from the MS by analysing the message flag of an access channel message, upon reception of the access channel message. If there is an access channel message to be consecutively received, the BS determines whether the MS requests designation of a channel on which to send the following message by analysing the channel designation request flag of the received access channel message. Upon request of channel designation, the BS sends a response message having a channel designation flag set if there is an available long code ID for the channel designation, and the long code ID. This procedure is repeated whenever a message is received and a currently designated channel can be identical to or different from the most recently designated channel. That is, the BS can designate the same channel if the previous designated channel is available for access channel message transmission, and select another channel if it is not available.

In accordance with the embodiment of the present invention, to transmit a message too long to be sent at one time, the MS sends a first common channel message segment on a common channel, with a message flag set and a channel designation flag set or cleared depending upon whether to use a channel designated by the BS. Then, the BS sends a response message for the received common channel message segment, with a channel designation flag and a channel ID set or

cleared depending upon the contents of the received access channel message segment. The MS sends the following message segment on a designated channel or a common channel on the basis of the information of the response message. Therefore, the present invention advantageously minimizes a message loss caused by message contention between MSes, increases the transmission efficiency of a common channel message, and rapidly performs a message transmission.

While the present invention has been described in detail with reference to the specific embodiment, it is a mere exemplary application. For example, though the description of the present invention is confined to a long common channel message transmission from an MS to a BS, the same operation in the reverse direction is also valid. Thus, it is to be clearly understood that many variations can be made by anyone skilled in the art within the scope and spirit of the present invention.

WHAT IS CLAIMED IS:

1. A common channel message communicating device in an MS of a CDMA communication system, comprising:

a channel receiver for receiving a message including a designated channel ID on a forward common channel;

a message generator for generating a reverse common channel message;

a message generator for adding a channel designation request to the reverse common channel message and processing the channel ID by analysing the received message;

a spreading code generator for generating a spreading code based on the channel ID; and

a channel transmitter for spreading the resulting reverse common channel message by the spreading code and transmitting the spread message.

2. The common channel message communicating device of claim 1, wherein the message generator adds the channel designation request to the reverse common channel message to send the message without a message contention with other MSes, if the message is so long that it should be sent at least two separate times.

3. The common channel message communicating device of claim 2, wherein when requesting a channel designation, the message generator loads information indicating the presence of a following message on the reverse common channel message, divides the reverse common channel message into segments, and outputs a message segment including the more message indicating information and the channel designation request to the channel transmitter.

4. The common channel message communicating device of claim 1, wherein if no designated channel ID exists in the received message, the message generator assigns a spreading code for a common channel and outputs the spreading code to the spreading code generator.

5. The common channel message communicating device of claim 1, wherein the channel ID is information for designating a channel on which the MS can communicate with a BS without a message contention with other MSes.

6. The common channel message communicating device of claim 5, wherein the channel ID represents use of a public long code generated with the ESN (Electronic Serial number) of the MS.

7. The common channel message communicating device of claim 5, wherein the channel ID is a long code ID prepared to prevent a message contention between MSes.

8. The common channel message communicating device of claim 1, wherein the message generator controls the spreading code of a common channel to be generated for the first message segment, and the spreading code of a designated channel to be generated for a following message segment.

9. A common channel message communicating device in a BS of a CDMA communication system, comprising:

a channel receiver for receiving a message on a reverse common channel;

a message generator for generating a message including a designated channel ID for assigning a channel spreading code to a reverse common channel message

if the received message includes a channel designation request; and

a channel transmitter for transmitting the message on a forward common channel.

10. The common channel message communicating device of claim 9, wherein the channel ID is information for designating a channel on which an MS can communicate with the BS without a message contention with other MSes.

11. The common channel message communicating device of claim 10, wherein the channel ID represents use of a public long code generated with the ESN of the MS.

12. The common channel message communicating device of claim 10, wherein the channel ID is a long code ID prepared to prevent a message contention between MSes.

13. A common channel message communicating method in an MS of a CDMA communication system, comprising the steps of:

(1) generating a reverse common channel message;

(2) analysing the reverse common channel message and sending the reverse common channel message with a channel designation request; and

(3) generating a spreading code corresponding to a designated channel ID included in a message received on a forward common channel, spreading the resulting reverse common channel message by the spreading code, and sending the spread message on a designated channel.

14. The common channel message communicating method of claim 13,

wherein if the reverse common channel message is so long that it should be sent at least two separate times, the channel designation request is issued, in the step (2).

15. The common channel message communicating method of claim 14, wherein the message is divided into frames and a message frame is sent with information indicating the presence of a following message frame, in the step (3).

16. The common channel message communicating method of claim 15, wherein if no channel ID exists in the received message, a spreading code for a reverse common channel is generated, in the step (3).

17. The common channel message communicating method of claim 14, wherein the channel ID is information for designating a channel on which the MS can communicate with a BS without a message contention with other MSes.

18. The common channel message communicating device of claim 17, wherein the channel ID represents use of a public long code generated with the ESN (Electronic Serial number) of the MS.

19. The common channel message communicating device of claim 17, wherein the channel ID is a long code ID prepared to prevent a message contention between MSes.

20. The common channel message communicating method of claim 13, wherein the channel designation request is added to a first reverse common channel message, and the resulting message is spread by the spreading code of a reverse common channel for transmission, in the step (3).

21. A common channel message communicating method in a BS of a CDMA communication system, comprising the step of:

receiving a message on a reverse common channel;

generating a message including a channel ID for designating a channel on which an MS can send the reverse common channel message, if the received message has a channel designation request; and

transmitting the generated message on a forward common channel.

22. The common channel message communicating method of claim 21, wherein the channel ID is information for designating a channel on which an MS can communicate with the BS without a message contention with other MSes.

23. The common channel message communicating device of claim 22, wherein the channel ID represents use of a public long code generated with the ESN of the MS.

24. The common channel message communicating device of claim 22, wherein the channel ID is a long code ID prepared to prevent a message contention between MSes.

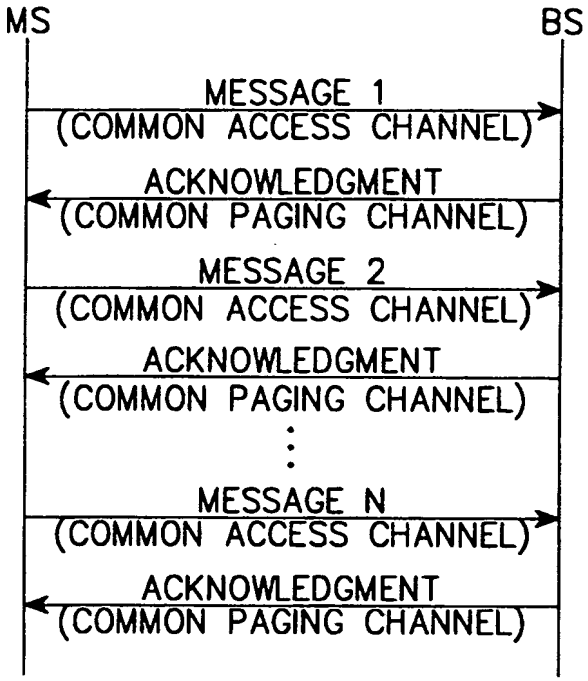
MS
BS
MESSAGE 1
(COMMON ACCESS CHANNEL)
ACKNOWLEDGMENT
(COMMON PAGING CHANNEL)
MESSAGE 2
(COMMON ACCESS CHANNEL)
ACKNOWLEDGMENT
(COMMON PAGING CHANNEL)
MESSAGE N
(COMMON ACCESS CHANNEL)
ACKNOWLEDGMENT
(COMMON PAGING CHANNEL)

FIG. 1

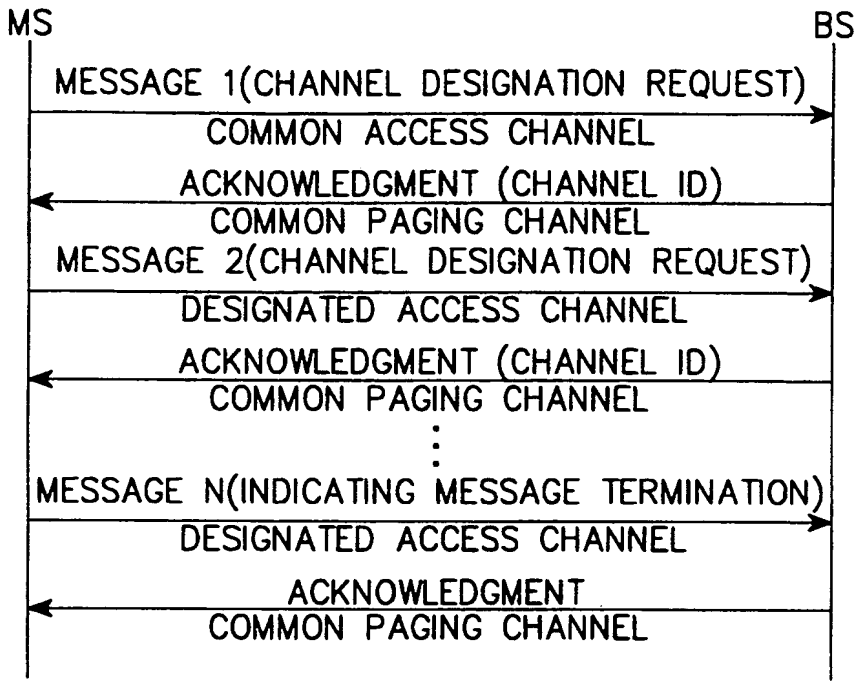

FIG. 2

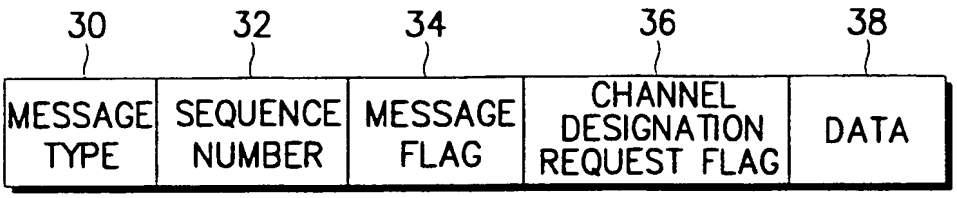

FIG. 3A

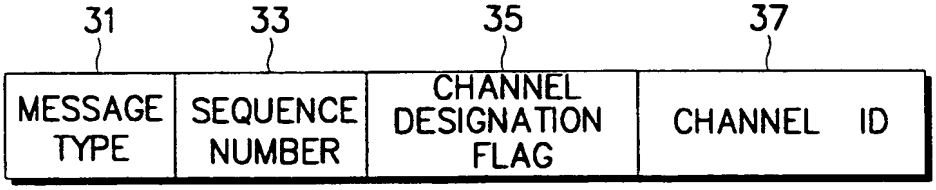

FIG. 3B

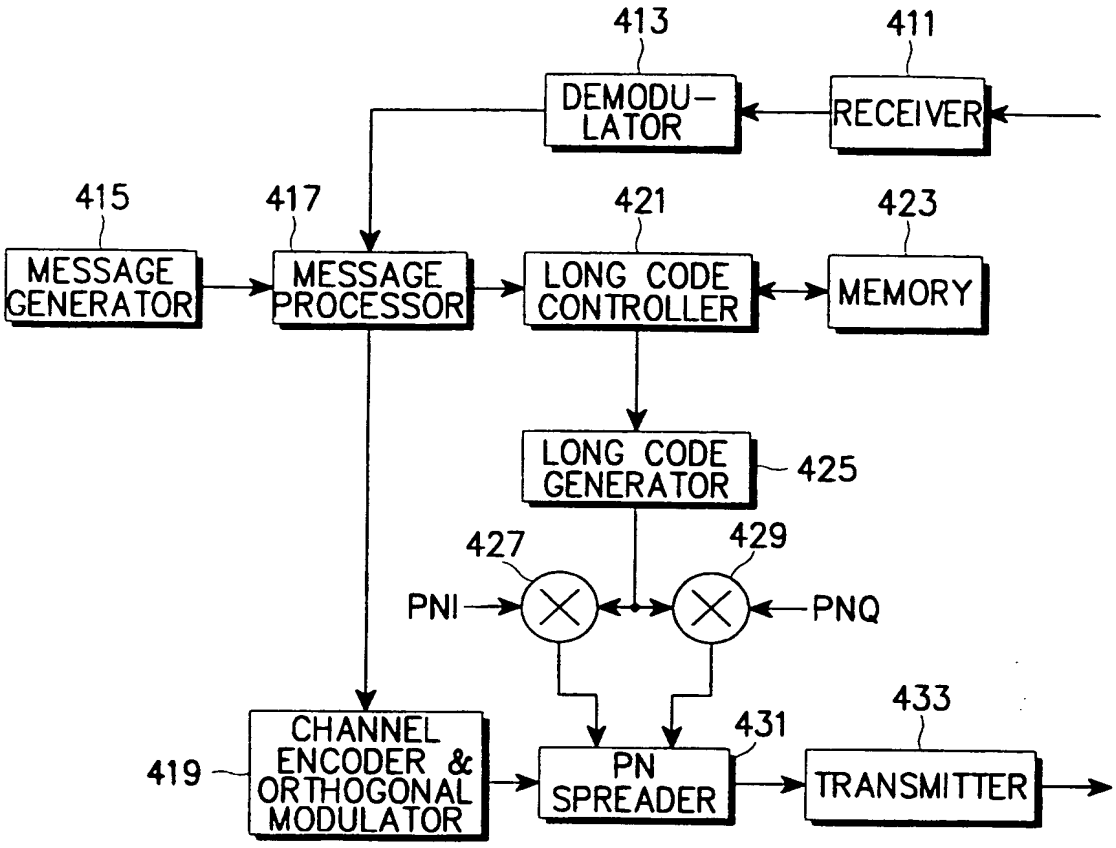

FIG. 4

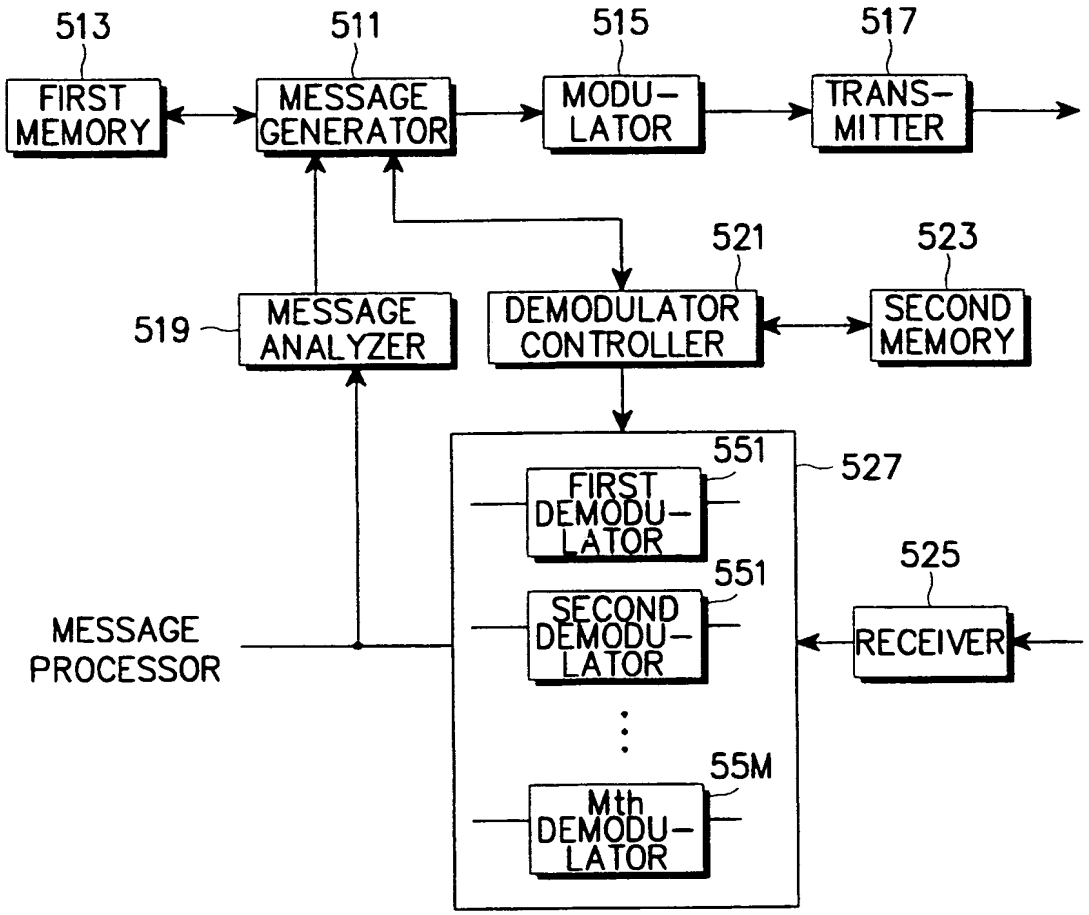

FIG. 5

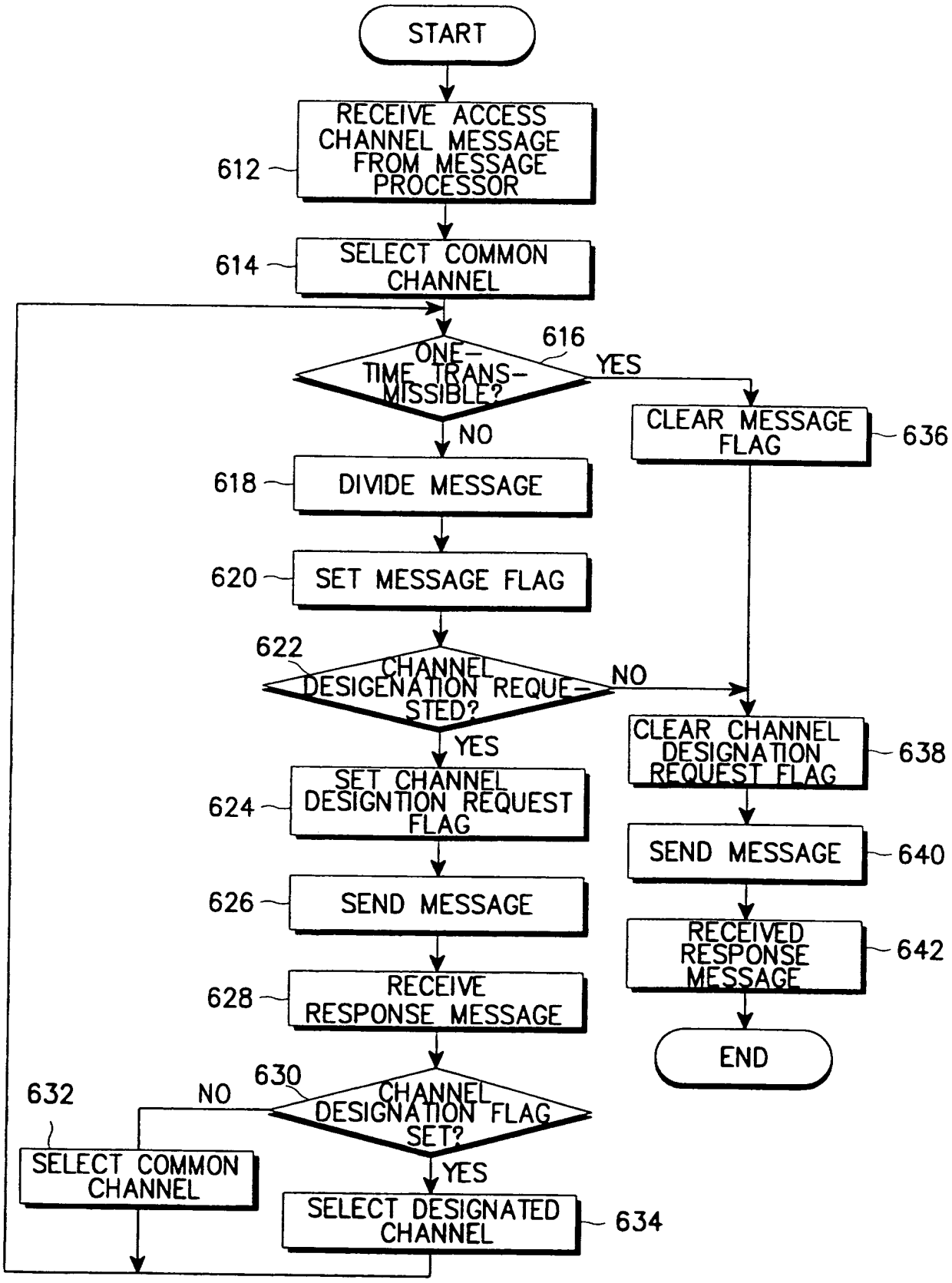

FIG. 6

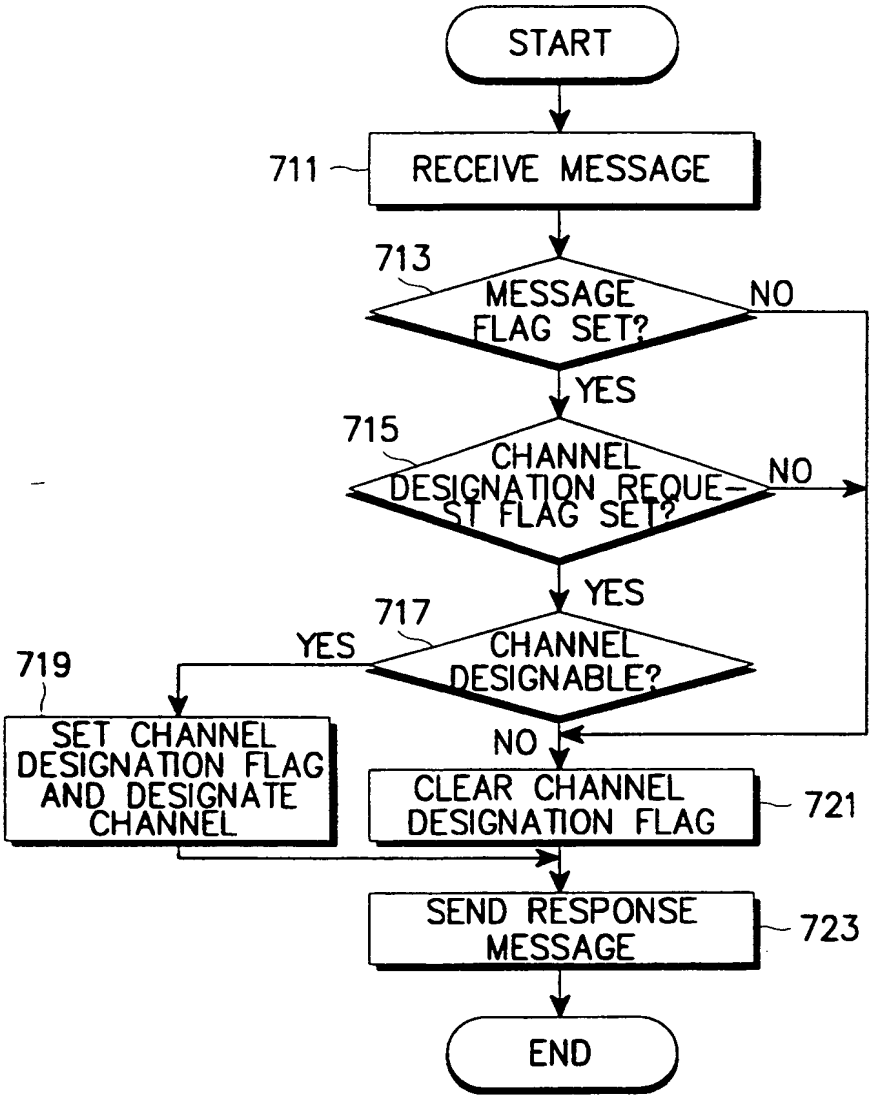

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 99/00175

A. CLASSIFICATION OF SUBJECT MATTER

IPC[6]: H 04 Q 7/38; H 04 B 7/216

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC[6]: H 04 Q; H 04 B; H 04 J; G 01 S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 765 096 A2 (NTT MOBILE COMMUNICATIONS NETWORK), 26 March 1997 (26.03.97), fig.1; abstract.	1,9,13,21
A	WO 97/46 033 A2 (PHILIPS ELECTRONICS N.V.), 04 December 1997 (04.12.97), fig.1, abstract.	1,9,13,21
A	US 5 508 708 A (GHOSH), 16 April 1996 (16.04.96), fig.2; abstract.	1,9,13,21
A	WO 97/47 094 A1 (QUALCOMM), 11 December 1997 (11.12.97), abstract; claim1.	1,9,13,21

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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„&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 July 1999 (20.07.99)	03 August 1999 (03.08.99)
Name and mailing adress of the ISA/AT Austrian Patent Office Kohlmarkt 8-10; A-1014 Vienna Facsimile No. 1/53424/200	Authorized officer Dröscher Telephone No. 1/53424/320

Form PCT/ISA/210 (second sheet) (July 1998)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR 99/00175

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